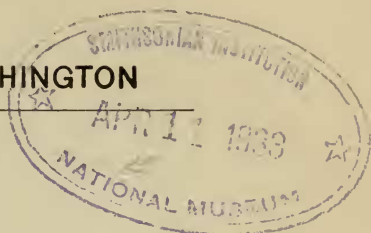


PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON



THE FOUNDING OF NEW COLONIES BY
RETICULITERMES FLAVIPES KOLLAR.

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During the early Spring of 1931, breeding and crossing experiments were again¹ instituted at Washington, D. C., with reproductive forms of the termite *Reticulitermes flavipes* Kol. (Fig 1). There have been differences in the results of breeding experiments carried on by entomologists in this country and abroad. In case of species of *Reticulitermes*, Snyder's experiments have shown that the first brood reared by macropterous adults are all workers except one or two soldiers. The first brood of brachypterous adults appear to be the same; but even in long established colonies no macropterous adults are produced where the parents are brachypterous. Of course where the parent adults are macropterous, winged or macropterous forms are later produced. No success has been attained in breeding apterous reproductive forms in these artificial colonies maintained in the laboratory.

Like the macropterous adults, brachypterous and apterous reproductive forms are true adult castes. They apparently breed true to type over long periods and never produce macropterous forms. Imms and the late Dr. Thompson with Snyder² believe that the origin of the termite castes can best be explained by genetics; there is a parallelism between these castes and Mendelian segregants. While the progeny would vary with the

¹ a 1920 Snyder, T. E. The Colonizing Reproductive Adults of Termites. Proc. Ent. Soc. Wash. XXII, no. 6, pp. 109-150 June.

b 1926 Snyder, T. E. The Biology of the termite Castes. Quart. Rev. Biol., vol. 1, No. 4, p. 522-52, figs. 15. Oct.

² 1925 Snyder, T. E. The Origin of the Castes in termites. Proc. Biological Soc. of Wash., vol. 38, pp. 57-68, May 26.

age of the colony of termites and with the genus or at least family, the character of the brood might be predicted by generalized formulae.

On April 18th, a series of eight groups of incipient colonies of macropterous males and females were placed gregariously in eight tin covered boxes each containing moist sand, a small block of white pine wood with a cell excavated on the under surface where in contact with the sand and several disks of specially washed pure cellulose filter paper, Whatman number 43.

These macropterous adults were collected at Falls Church, Va., from parent colonies from which the first swarm of winged adults had not yet occurred that season. Since they still had their wings, copulation had not yet taken place. Young brachypterous adults, freshly molted to maturity but not fully pigmented, were also collected from these colonies in nature before the swarm and hence these forms also had not yet copulated. Copulation does not take place until after leaving the parent colony and the establishment of new incipient colonies.

On April 27th, two similar pure incipient colonies of brachypterous sexual adults of *R. flavipes* were established gregariously in like manner with the exception that workers were added, as has been found necessary to feed these reproductive forms free from intestinal protozoa, as well as a few soldiers.

On April 29th and 30th, ten colonies of crosses of macropterous and brachypterous males and females were established gregariously in similar colonies, workers and soldiers being added. The ratio of males to females ranged from an equal number, as 6 to 6; to one half as many, 11 males to 22 females or 17 to 34; or the proportion of 14 males to 18 females, or 15 to 19.

Sexual attraction was immediately evidenced in the crossed as well as pure colonies. Apparently there was no difference in degree, whether the male was macropterous or brachypterous, the female of the opposite type was equally attractive and attracted, for this caudal attraction of male to female was also to be evidenced in attraction of the female to the male.

On April 20th, in the pure colonies of macropterous adults there was aggregation to the soil underneath the filter paper disks—no adults were in the cell previously excavated in the

block of wood for them,—all were dealated. April 21st showed definite funnel shaped pits.

On May 11th clusters of eggs the size of small peas were in these colonies; on May 17th more eggs were present—all being in a mass together or in other cases there being two smaller clusters in separate cells.

On May 28th one newly hatched termite was observed. On June 2nd from 1 to 8 recently hatched young were observed in the colonies. On June 20th and 24th young and eggs were numerous. On June 29th eggs and young were present. On July 7th there was a noticeable difference in the sizes of the young of various ages, eggs were also present. On July 18th some of the young were fairly large, newly hatched young still were present. On July 24th and 30th young of different ages were present, some of fairly large size, young were numerous in these gregarious colonies, eggs were also present. On August 8th clusters of eggs, recently hatched young and young of larger size were present. August 14th showed but little change. On August 24th the young were of fairly large size.

On Sept. 4th, several colonies were dead, others moribund, the young either dying or being eaten before the death of the adults. On Sept. 12th and 21st, many young were present in the surviving colonies, including recently hatched young. On Oct. 2nd and 12th fairly large to very small young were present in these colonies. On Oct. 22nd other colonies were dead, the young always being the first to disappear. Clean filter paper was constantly used to replace moldy paper and films of mold on the sand were removed when observed. The temperature and humidity were kept as nearly the same as possible.

On Nov. 3rd, 11th and 24th, young were present in all remaining colonies; Dec. 4th showed the same condition. On Dec. 9th and 14th no recently hatched or very young were observed in the three surviving colonies. All of the brood were of the nanitic mature adult size so characteristic of young or incipient colonies. Only one or two soldiers were present, all of the others being workers.

To date, these experiments conducted during 1931 confirm the results of previous breedings first begun in 1911. The progeny of pure colonies of macropterous males and females is the same during the first nine months whether the colonies are

in the aggregate or whether a single male and female produce the brood.

Gregarious colonies appear to be relatively somewhat healthier and more aggressive than those where the parents consist of a single male and female. This is interesting in connection with the experiments of Dr. W. C. Allee of the University of Chicago relating to the rôle of aggregation in ecology. Of course our data are meagre and inconclusive. Cleaning mold or mycelium off of each other during "trophallaxis" or licking each other might explain these more favorable conditions in gregarious colonies.

True cannibalism was observed, healthy young being eaten—although food and moisture were apparently favorable. Filter paper was preferred to wood. Only in one colony was the artificial cell made in the block of wood utilized; in this case it was covered over with a shed of sand. In two other cases tubes or sheds of sand were constructed on the bottom or sides of the wood and used for colony habitations. In one instance the top of the block was grooved.

In the two pure colonies of gregarious brachypterous males and females established on April 27, young were produced, shortly after which both colonies died due to heavy mold infections.

The ten colonies of the crosses established on April 29th and 30th were in healthy condition on May 11, the males and females were active in cells together and the brachypterous reproductive adults were attaining a deeper yellow-brown pigmentation. On May 15 about three dozen eggs were present in one colony. Nematodes were abundant in some of the colonies and apparently destroyed two colonies. On May 17th the eggs were being tended by workers. On May 29th the workers were moving the eggs about from place to place so that sometimes the eggs were visible, at other times not. All but two of the surviving colonies had now died, probably due to mold. On June 1, the eggs were fewer in numbers.

On June 25th young termites several days old were observed in the colony where the 7 males were brachypterous and the 16 females were macropterous. On June 17, 24 and 29 a few young termites of different ages were observed in both remaining colonies; at least five young were visible at one time.

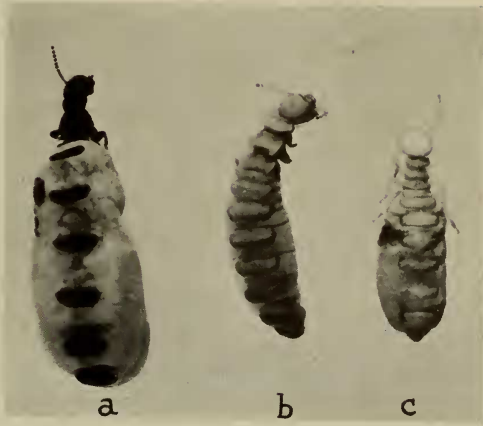


Fig. 1. Three types of female reproductive forms or queens of *Reticulitermes flavipes* Kollar, each type has a male of corresponding form. (a) Queen developed from the winged adult or macropterous type; (b) queen developed from the short wing pad or brachypterous form; (c) the wingless or apterous type of queen. Greatly enlarged, all are physogastric.